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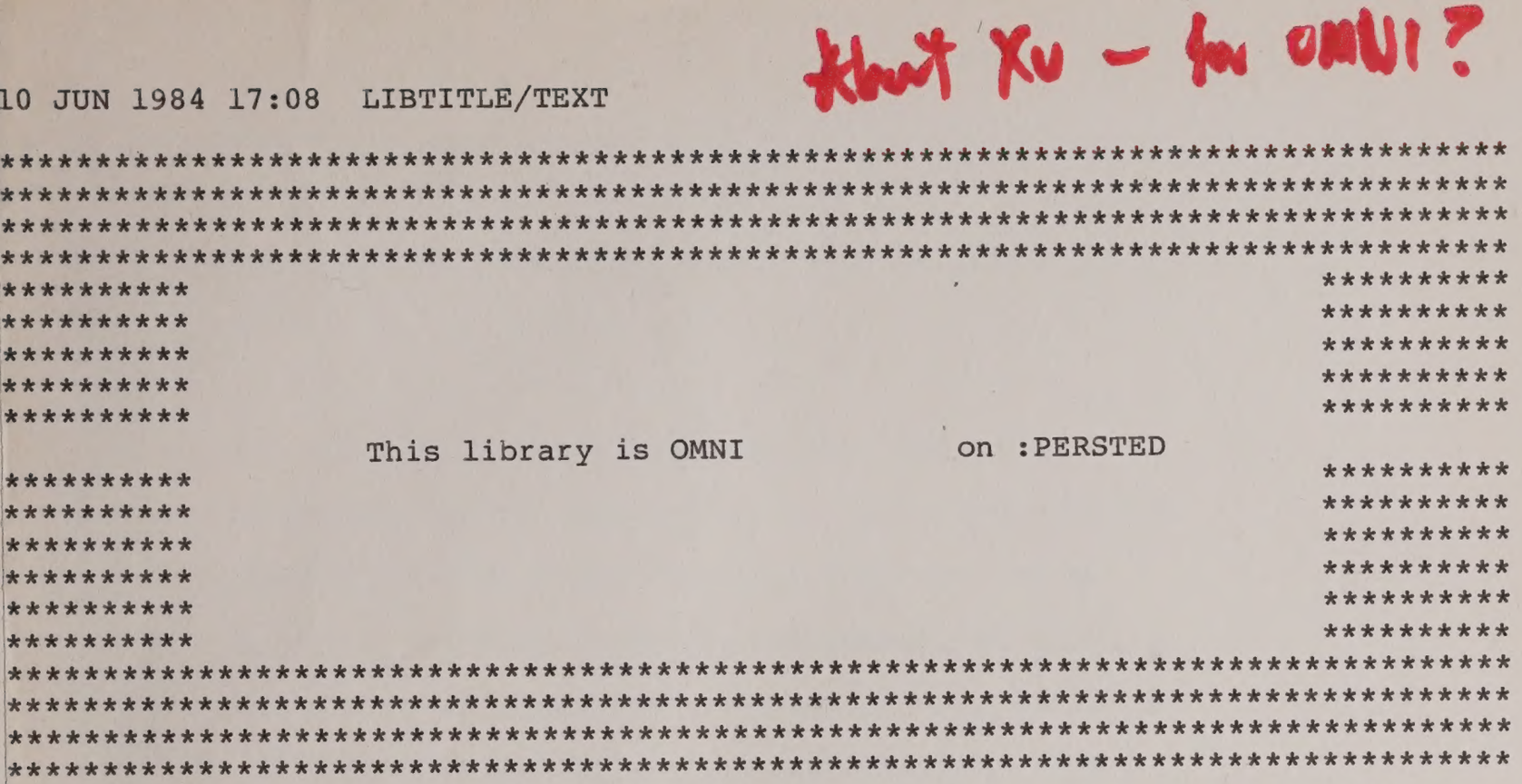
about Xu - for OMNI?



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rapidly reworking them as you go. Suppose, for instance, you are looking at a legal argument (or a love scene), as written one way, in the left-hand column; the matching part or parts automatically appear in the right, together with other indications of where they appear in the document, etc. So presented, a well-designed system will let you easily make your final choices (if any are needed) and revisions.

This was a perfectly valid idea, but very hard to explain to people when I first worked it out, and incredibly hard to carry out in practice. This is because the showing of "corresponding parts," especially for large documents in large clusters of similar documents, turned out to be an extremely hard problem of computer data structure.

I struggled on with it alone, designing, reading, going to conferences, giving speeches, for years. And gradually the idea expanded and shifted emphasis. It became, not just an idea for one individual's working console, but the idea of a whole string of computers which, besides furnishing data to such working consoles, would be a storage library for everyone.

(I made up my own terms for what I was doing because there weren't any. The term "word processing" appeared about 1967, the terms "file

server, " "database machine" and "network" for computer repository systems appeared gradually, and the term "decision support system" and "videotext" about 1981. All these describe it now.)

I dubbed the system "Xanadu" in 1967, when I was working at Harcourt, Brace & World publishers. Taken from the poem Kubla Khan, the name "Xanadu" has rich connotations in the literary world; it is associated with poetry, trance-like states of inspiration, weird beauty, the exotic and dangerous, and the illusions and sentimental recollection of the past. The appropriateness of the name is best summarized as "magic place of literary memory."

After twenty-one years of my work, the Xanadu system finally operated in prototype-- basically according to the original specifications-- in early 1981. Since then it has been undergoing continual refinement and improvement. Dozens of people have worked on it with me over this time. It is now being readied for commercial use by a group in Ann Arbor, Michigan, which is about to relocate in the San Francisco Bay area.

WHAT IT REALLY IS

In its present form, much evolved from the

original conception and able to do much more, we can think of the Xanadu system as three things. I will explain them in turn.

1. It is A FORM OF STORAGE managing VERSIONS AND LINKS.

A. First part of this explanation: VERSIONS.

The Versioning Problem, as we call it, is the fact that every document typically consists of several versions. Sometimes this is a permanent situation, as when a given report is rewritten for several different audiences; sometimes it is temporary, as when a document evolves through different stages toward a supposedly "final" version.

The versioning problem is simply how you keep track of it all: management of all the different possible arrangements of the same text, notes, etc., that someone wants to use. Who saw which version? What version is filed where? How can a comment someone made on last week's draft be communicated to the person who is working on today's? This problem in its general form is universal: it occurs in most lines of business and government, as well as, of course, academia and publishing. Technical personnel spend hours inserting "change pages" in their manuals.

Computer programmers waste an enormous amount of time saving and renaming their files and managing their file spaces. Separate drafts of speeches travel together in politicians' briefcases, ready for a quick switch at the last minute. Boeing must keep track of the similarities and differences among a dozen different models of the 747.

However, in every area of endeavor, people treat their own versioning problem as a minor embarassment, a mere mechanical problem, no matter how much trouble and delay it causes. Our estimate is that between 5% and 10% of the gross national product is tied up in the versioning problem. (Note, too, that hundreds of separate computer programs have been created at various establishments (such as Boeing) to deal with one part or the other of the versioning problem as they see it, handling it only as a complex special case-- which covers only part of the general versioning problem as we see it. We believe we have solved it as a simple unity.)

What you really want, I believe, is a facility that allows you to keep track of all your uses of all versions of a thing; and for the most difficult problems facing executives, heads of state, military commanders, movie-makers and philosophers, a way easily to compare different

versions of the thing-- whatever it is-- side-by-side on the screen.

So far as we know, the Xanadu system is the only system for taking care of all aspects of the versioning problem, and we do it very well. The Xanadu system does not store every version of a document separately. Rather, it treats a family of versions-- a document or Thing-- as one pool of pieces; each version is simply a sequence of these pieces. Thus alternative or complicating versions of any documents are easily kept track of. What other people consider many <u>different</u> document versions are actually, inside this machine, all parts of a single unified object.

B. Second part of this explanation: LINKS.

For stored documents of any kind-- text, pictures, etc.-- you want to be able to make bookmarks, underlines and so on, without modifying the original or saving a whole new copy. No computer systems that we know of offer this except ours.

Moreover, you may want to create writings that have no fixed sequence-- hypertext, or branching text. The Xanadu linking facility makes this easy.

C. Third part: LINKS AND VERSIONS TOGETHER.

Not only do you want versions and links. You want to be able to make a link to one version and have that link attach to all the parts that are the same in all the versions. The Xanadu system takes care of this automatically.

Xanadu storage, then, is storage which automatically keeps track of your links and versioning. Used as a generalized storage device (now called a "file server,") it brings any part of any version of any document on request, furnishes all the corresponding parts of documents on request, and brings the material at the end of a given link in whatever version you request. (The full set of system functions is listed in the Appendix to Literary Machines. These functions may at first seem arcane and obscure. In fact we believe they must be the heart of any computer text system for the long-term future.)

Your computer screen attached to the Xanadu system gives you an Idea Workbench. But the Xanadu system no longer "looks" any particular way to the user at the console, however, since you may attach any viewing computer to it that you like. Thus the way Xanadu documents "look" to you is the way your computer is programmed to show them.

C. Third part: LINKS AND VARIONS TOGETHER.

Not only do you want versions and links. You want to be able to take a link to one version and have that link attach to all the parts that are the same in all the versions. The Xanadu system takes care of this automatically.

Xanadu storage, then, is storage which automatically keeps track of your links and versioning. Used as a generalized storage device (now called a "file server,") it delivers any part of any version of any document on request, maintains all the corresponding parts of documents on request, and stores the material at the end of a given link in whatever version you request. (The full set of system functions is listed in the Appendix as Literary Machines. These functions may at first seem arcane and obscure. In fact we believe they must be the basis of any computer text system for the long-term future.)

Your computer screen attaches to the Xanadu system gives you an Ideo Windscreen. But the Xanadu system no longer "looks" any particular way to the user at the console, however; since you may access any viewing computer to it that you like. Thus the way Xanadu operates "looks" to you is how you may your computer is programmed to show that.

2. It is a Network-to-Be and a Publishing Medium.

Given that we have this magical form of storage-- handling both multiversioning and links-- we propose to make it a public-access network, and add automatic royalties for document owners on anything published. In other words, it will be a publishing system for users hooking up their computer screens from anywhere.

This has many subtle implications. One is that the reader may make marginal notes on anything-- links-- that stay in place even as the owner of a stored document keeps changing that document. This is an emerging problem no one else offers to solve. Another is that you can be allowed to quote anything that is already published-- since royalty to the actual copyright owner is automatic, and nothing is ever quoted out of context; the reader can always punch up the original context of any quotation.

These capabilties make the Xanadu system, we believe, a publishing system for the permanent storage and evolution of ongoing literature-- in other words, a strong, worthy and lasting publishing system for all mankind. It has also been designed to grow indefinitely without substantial slowdown in its performance-- that is, servicing billions of users simultaneously reading

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from trillions of documents, and adding more all the time.

3. The Xanadu System is a Wild, Wild Dream.

The people who are working on the Xanadu project are not run-of-the-mill computer programmers. They-- we-- are best understood as wacko fanatics of a very high intellectual caliber. We see the actual possibility of changing the world, now, by providing a facility which will give new intellectual powers to everyone.

People who are enthusiastic about today's low-grade "computer networking" are not general intellectuals or idealists like the Xanadu team. They conceive of tomorrow's information utility as a rather simple matter, and expect everyone to have to adapt to the simpleminded approach they want to give us. The Xanadu group, by contrast, cares furiously about the intellectual future of the world, about restoring literacy and intellectual involvement, about upgrading the mental life of mankind, and about freedom pure and simple (as well as sullied and complex). And we believe that the Xanadu system, while no panacea, stands a red-hot chance to become the publishing medium of the future. Mainly because we believe we have thought out the real problems-- in data

structure, in business arrangements that will work, in civil liberties, and in what people will really want.

In our publishing medium, for instance, because any new document may quote any of the older ones, we foresee the publication of many "overlay documents"-- documents which build upon what is already available and published in the network-- commenting on them or explaining them. Thus we expect clarifications and popularizations of all knowledge to become rapidly available, linked to the source material, and making possible a new level of easy access to new ideas (and old) that we could never have had before. Any author may publish links showing connections he has discovered between things already on the system. Each user may add layers, describe in words the relationships he sees, and actually show them to the reader through doorways to the earlier documents. And rather than being more complicated, the material should keep getting simpler to understand-- as better and more insightful introductory material keeps being added.

Perhaps this dream of a world-wide network of storage, universal as the telephone system and supplying writings, text and music to billions of simultaneous users-- documents piled layer upon

layer with links, windows and alternative versions-- seems a trifle far-fetched. But so it would have seemed far-fetched, too, when Alexander Graham Bell showed his first pair of telephones at the industrial exposition, had he spoken of a world-wide network. (Which is the big step? I believe it is the step from the idea to the first system that actually works-- not the later expansion from one to many. Alexander Graham Bell took that step and so have we; now the Xanadu group is in the position of Al Bell showing off his first two phones.)

Could such a thing be? Now consider the question from my perspective. I saw in my 1960 illumination the console I wanted, and drove for it; as I pressed on and on, the vision of personal computing came to me, and of the universal network. In my report to president Jovanovich of Harcourt Brace in 1968, I predicted the four-bit processor chip, which I said would soon be followed by the 8-bit processor chip and an avalanche of home computers, much outstripping the Philips videodisc for which so much was being predicted in those days. Those predictions were exactly correct, as were most (though not all) of my other predictions; I believe I have the best track record for predictions in the computer industry, though because Jovanovich will not allow me to publish my 1968 book (he considers it still

to have been a Secret Report), I cannot prove it.

But these successes have only confirmed my sense of certainty that Xanadu is the right path. Thus what to the newcomer may seem a bizarre and jagged fantasy is to me a serenely certain reality, 92% achieved already, as real as a train coming at us five miles down the track; though to others it is also like the train-- out of sight.

While the Xanadu project has many sympathizers, it is considered too far-fetched by most people who hear about it; morevoer, we rarely get the chance to explain what it really is, so it has some kind of a pie-in-the-sky reputation. Nevertheless it exists, it is built on very new internal software mechanisms, and it works. We who are working on it feel certain of its future viability; the question is not "whether Xanadu will succeed," but to what degree it will fully prevail, and to what degree it will live in compromise or symbiosis with other networks that will be available in the future.

The Xanadu system is not elitist but the opposite. While we, its developers, are part of the intellectual elite, we see it as an engine for expanding knowledge and understanding-- for expanding the elite, in other words-- to all mankind.

Unlike some people's notion of a computer information system, the Xanadu system does not purport to offer any kind of Ultimate Truth. Instead it merely offers all viewpoints exactly (if people choose to express them there), which is-- and must remain-- the Western world's compromise solution to the problem of ultimate truth. Pluralism is the solution offered under freedom of the press; and this, we expect, will be the new printing press.

To sum it up: the Xanadu system is simply a sort of hyper-word processor with multiple versions, windowing, and side-by-side viewing. Also a proposed publishing network with very unusual implications and great ideological thrust pushing it.

IS THE XANADU SYSTEM KORZYBSKIAN?

It had not occurred to me when I started to write this that there was a connection between Korzybski and the Xanadu system. As I have thought about it, however, I have been astonished to realize how deep the connection is.

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Unlike some people's notion of a computer information system, the Xanadu system does not purport to offer any kind of ultimate truth. Instead it merely offers all viewpoints exactly (if people choose to express them that way). What is--and must remain--the Western world's compromise solution to the problem of ultimate truth. Pluralism is the solution offered under freedom of the press; and this, we expect, will be the new printing press.

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The Xanadu system may be thought of as both a scheme for writing and a form of publication that imposes no structure, unlike so many "structured"

systems that have structure built in. Not the Xanadu system. Word processors require writing that is sequential, the Xanadu system does not. Document filing systems on computers generally impose some paricular ways you must name or organize them (like the Unix hierarchy). Not the Xanadu system. Unlike any other computer system I can think of, the Xanadu system imposes no structure whatever on its contents, but accepts writings which are sequential, nonsequential, or simply all in pieces, and named anything whatever. It simply offers facilities for whatever structure you want to put in. Thus new maps may continually be added, giving more and more insight about the terrain.

Moreover, Xanadu storage and presentation allows you to see at any time the exact difference between any two related documents. This, it seems to me, is Korzybski's Structural Differential in action: living clarification of exactly what parts are the same between two things, and what are not.

I should point out the extraordinary interpenetration between my own Korzybski-inspired philosophical work and Project Xanadu. The Xanadu system was originally inspired by my philosophical work, and intended to help me complete it, as mentioned earlier. Not only that, but the Xanadu system itself models my philosophical work

closely-- it has to, if it is to be of any help. The Xanadu system, like my philosophical models, deals with both verbal and structural representation, and permits the connecting linkages between all subjects to be mapped with little restriction. In other words, complex representation of anything to any degree of exactitude is possible, and the user may abstract and interconnect his material of interest in any direction and to any degree, adding layers which clarify while retaining the value of what is already there. These things are so for my proposed vocabulary; they are so for the Xanadu system.

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